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U. S. DEPARTMENT of AGRICULTURE ★ SOIL CONSERVATION SERVICE

WATER SUPPLY OUTLOOK FOR MONTANA

and
FEDERAL-STATE-PRIVATE COOPERATIVE SNOW SURVEYS
Collaborating with
MONTANA AGRICULTURAL EXPERIMENT STATION

AS OF
OCT. 1, 1981

UNITED STATES DEPARTMENT OF AGRICULTURE
SOIL CONSERVATION SERVICE
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BOZEMAN, MONTANA 59715
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SUMMARY of 1981 SEASON

Some mountain snowfall occurred in the beginning of the 1981 water year but moisture levels were well below average during December in most areas. Conditions along the Canadian border in northwest Montana were nearer to average. Rains and warm weather combined to create some flooding in the lower elevations of the Kootenai River drainage.

During January, snowfall was very deficient with little moisture during the month's first three weeks. Temperatures well above average created problems at most ski areas. Many snow courses reported new minimum water content of record on February 1. Statewide snowpack was about half of normal.

February brought some increased storm activity, but the snowpack at month's end was still 50 to 60 percent of average in most areas. A few areas reached 70 percent and some dropped as low as 30 to 40 percent of average. One extreme cold front, the only one of the season, moved through the entire state in February but lasted only one to two days. In general, temperatures were above average for most of the month and most valleys had no snow cover.

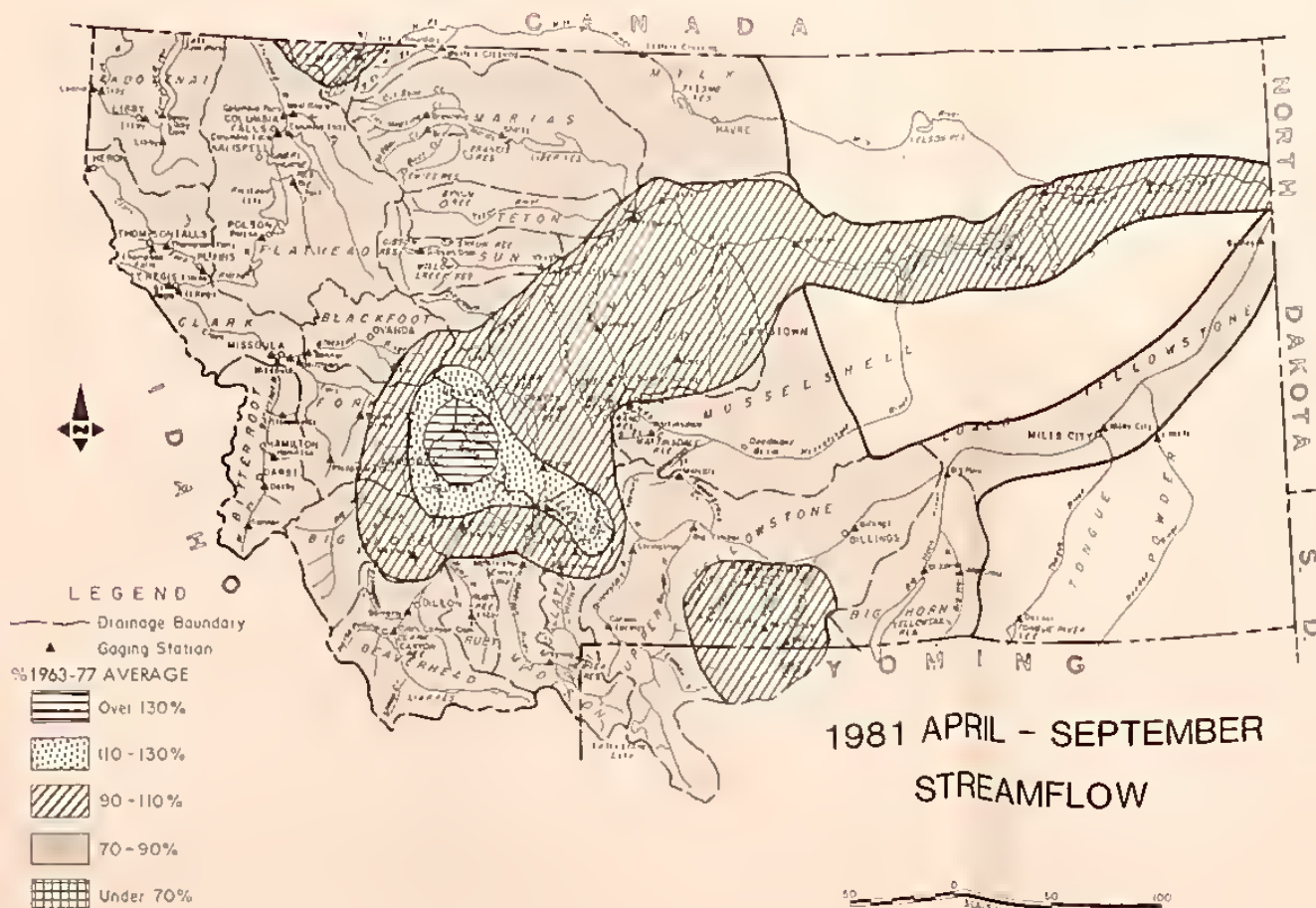
Snowfall during the first half of March was extremely light. The Butte-Anaconda-Helena area received heavy snow around mid-month. As March ended, about one-third of the snow courses still had minimum water content of record with most areas reporting 40 to 60 percent of average snowpack. A few areas were in the 70 to 90 percent range. Temperatures through March continued warm.

Some snowfall occurred around the state until mid-April when mountain snowmelt began. Some areas received rain during April. The mountain snowpack was about 50 to 60 percent of average by May 1st with conditions somewhat better in the northwest corner. Soil moisture conditions improved with melt and rains.

May began with warm temperatures and considerable snowmelt. By the second week, heavy precipitation had developed in some central Montana areas. Frequent storms and cooler weather retarded melt. Soon after mid-May a combination of heavy rainfall, saturated soil, and snowmelt caused record floods in areas around Deer Lodge, Helena and Bozeman. Snowpack remained below average, however rains had saturated all soils and reservoirs were full. The moist and cool weather continued into mid to late June.

The summer was generally hot and dry although some rainfall did occur in eastern Montana in August. By mid-September, soils had dried and moisture improved, but most areas did not receive enough precipitation to wet the soil at lower levels. Storage levels in most reservoirs are near to a slightly below average.

Most drainages had below average runoff over the period from April through September. One exception is the area along the Continental Divide between Deer Lodge and Helena where the heavy moisture in mid-May generated flooding conditions. Seasonal runoff in this area was well above average.



Based on Provisional Data provided by:
U.S. Geological Survey
Bureau of Reclamation
National Weather Service
Soil Conservation Service
Montana Power Company
and others

1981 APRIL - SEPTEMBER
STREAMFLOW

1981 Snow Cover Comparisons - Percent Average

DRAINAGE	Jan. 1	Feb. 1	Mar. 1	Apr. 1	May 1
Columbia					
Kootenai	-	79	70	66	70
Flathead	76	63	67	68	71
Upper Clark Fork	59	46	56	62	54
Lower Clark Fork	61	49	53	53	52
Bitterroot	80	53	53	51	48
Missouri					
Jefferson	79	55	64	72	57
Madison	68	55	62	61	46
Gallatin	48	45	57	59	47
Missouri Main Stem	74	56	63	77	57
Marias-Teton-Sun	69	50	47	45	39
Judith-Musselshell	73	60	61	66	49
Milk	33	37	33	41	9
Saskatchewan					
St. Mary's	102	69	73	82	58
Yellowstone					
Yellowstone (above Bighorn)	59	47	57	57	45
Bighorn	-	54	54	57	41
Tongue	-	48	47	40	26
Powder	-	54	64	60	12

RESERVOIR STORAGE (Thousand Acre Feet) END OF MONTH Oct. 1, 1981

Bureau of Reclamation		RESERVOIR	Usable Capacity	Usable Storage		
				This Year	Last Year	Average
COLUMBIA						
Kootenai	Kootenai	5,694.0	5,606.0	5,551.0	--	
Flathead	Hungry Horse	3,428.0	3,277.0	3,213.0	3,162.0	
	Flathead Lake	1,791.0	1,725.0	1,761.0	1,740.0	
	Camas (4)	45.2	19.2	22.0	17.5	
	Misslon Valley (8)	100.3	13.8	21.9	27.3	
Clark Fork	Georgetown Lake	31.0	30.6	30.9	28.3	
	Lower Willow Creek	4.9	0.6	1.3	1.0	
	Nevada Creek	12.6	4.3	4.4	4.0	
	Noxon Rapids	334.6	323.5	330.2	325.8	
Bitterroot	Painted Rocks	31.7	--	--	22.7	
	Como	34.9	--	--	2.5	
MISSOURI						
Beaverhead	Lima	84.0	11.6	35.0	34.6	
	Clark Canyon	257.2	122.6	147.7	118.0	
Ruby	Ruby	38.8	6.5E	15.2	13.3	
Madison	Hebgen Lake	377.5	341.2	342.2	338.0	
	Ennis Lake	41.0	37.6	38.1	36.2	
Gallatin	Middle Creek	8.0	2.9	3.6	3.0	
Missouri	Canyon Ferry	2,043.0	1,644.0	1,849.0	1,767.0	
	Hauser & Helena	61.9	63.0	52.2	58.2	
	Lake Helena	10.4	10.9	10.9	10.5	
	Holter Lake	81.9	81.4	81.4	77.6	
	Fort Peck Lake	18,910.0	15,720.0	15,940.0	16,690.0	
Smith	Smith River	10.6	4.6	4.3	5.6	
	Newlan Creek	12.4	10.7	9.5	--	
Musselshell	Bair	7.0	1.9	3.4	3.1	
	Martinsdale	23.1	10.0	9.2	9.9	
	Deadman's Basin	72.2	39.6	43.3	35.3	
Sun	Gibson	99.0	18.6	33.3	30.2	
	Willow Creek	32.2	21.9	17.9	19.0	
	Pishkun	32.0	21.9	7.1	14.5	
Marlas	Lower Two Medicine	11.9	--	--	4.0	
	Four Horns	19.2	--	--	11.1	
	Swift	30.0	7.1	13.2	13.0	
	Lake Frances	111.9	78.1	81.3	68.8	
Milk	Elwell (Tiber)	1,347.0	526.2	573.4	601.7	
	Beaver Creek	3.5	0.6	0.9	2.0	
	Fresno	127.2	40.1	36.3	74.2	
	Nelson	66.8	16.4	23.2	43.4	
HUDSON BAY						
St. Mary's	Lake Sherburne	66.2	4.6	7.4	7.4	
YELLOWSTONE						
Stillwater	Mystic Lake	21.0	18.5	19.4	19.3	
Clark's Fork	Cooney	27.4	3.0E	12.3	13.1	
Tongue	Tongue River	68.0	21.3	9.1	27.0	
Bighorn	Bighorn Lake	1,356.0	1,055.0	1,080.0	679.7	

SNOTEL UPDATE

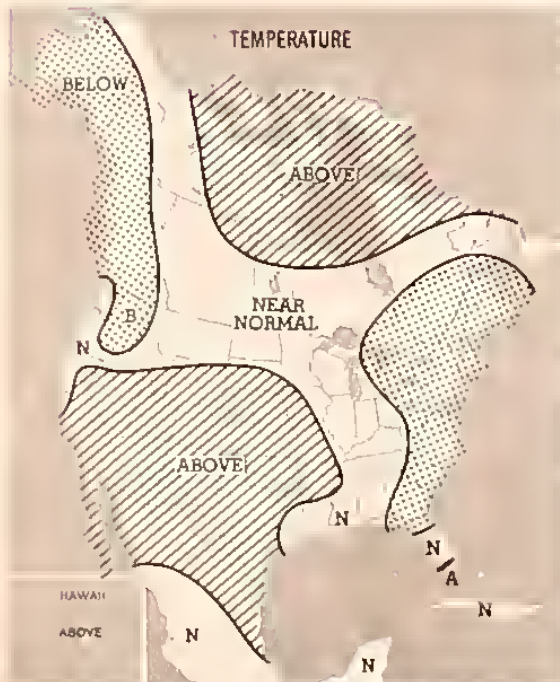
There are 64 operational SNOTEL sites in Montana. Air temperature, total precipitation and snow water equivalent from each site are being reported twice daily. Additional sensors are proposed at some sites to monitor water levels in stream channels, soil moisture, and soil temperature. Data from additional snow sensors using different techniques for determining snow water equivalent are also being added to the SNOTEL system.

Considerable effort is being devoted to improving system reliability and reducing down time.



average monthly weather outlook

FOR OCTOBER 1981



ACID PRECIPITATION

Now that the summer field season is coming to an end, we are able to spend a little more time on reports and analyses.

One high priority study involves tabulation and analysis of surface snow pH information collected on snow surveys last winter at snow course locations.

Approximately 450 individual pH readings were obtained last season by many cooperating snow surveyors. The pH levels observed over much of the state are in the range expected, or from 5 to 6. However, there appear to be some areas, particularly in extreme southwestern Montana, where pH levels are consistently below 5. Normal precipitation pH is around 5.6. A pH of 4 is 10 times more acidic than a pH of 5, while a pH of 3 is 100 times more acidic than a pH of 5.

Hopefully, the study will provide insights into acid precipitation in Montana including: (1) snowfall pH levels in the Montana mountain areas; (2) seasonal changes or changes associated with differing storm patterns; (3) changes in snowfall pH during average years compared to the below average level last year; and (4) comparisons between mountain and valley observations associated with the increased frequency and accumulation in higher mountain areas.

A final report on our findings will be released when completed.